

# Teacher's Guide



## Iron Ore to Cast Iron Stove Parts

*Please read and study this condensed story about the direct contributors to the iron-making process.*

In order to perform the smelting process, which is the removal of iron from iron ore in a blast furnace, numerous individuals are required to execute specific tasks. The natural resources that are required for these workers to fulfill the process are **iron ore**, **limestone** (flux/cleaning agent), **charcoal** (fuel), and **water** (waterwheel power for air blast).

**The Iron Ore:** Mining iron ore from open-pit mines in the Hopewell area was done by **miners**. The ore was loaded on wagons which were generally pulled by draft horses; **teamsters** were the people that handled these horses and wagons. The load of iron ore was brought to the furnace area.

**The Limestone:** Limestone was the flux or cleaning agent that removed the impurities from the iron ore, thus allowing the iron to separate out of the ore. Limestone was quarried (type of mining) locally by the **quarrymen**. As with the iron ore, limestone was loaded on wagons and ushered to the furnace area by the teamsters.

**The Charcoal:** In order to make charcoal, wood is needed. **Woodcutters** were hired to cut down trees so that those trees could be processed into charcoal. **Colliers** stacked wood, covered the wood with leaves and dirt, ignited the wood, and allowed the wood to smolder until all moisture and impurities were expelled, leaving only charcoal. A collier raked the cold charcoal from the pile, loaded it into the wagons, and the teamsters hauled it to the charcoal shed at Hopewell.

**The Water:** A waterwheel was needed to operate a huge "bellows" in order to produce the blasts of air required to burn the charcoal at maximum temperatures. The water that powered the waterwheel was brought from various sources via headraces (man-made waterways).

**The Furnace:** The **ironmaster** was the general manager of the furnace enterprise; usually he was the owner or a partner of the company. The ironmaster employed the **founder**; the founder was the highly skilled manager of the furnace operation. The founder's experience and knowledge were important factors in determining the quality of the iron that was produced. The assistant to the founder was the **keeper**. The keeper directed the furnace work when the founder was not present.

**The Workers:** Under the direction of the founder (or keeper) the semi-skilled **filler** would place the raw materials in the top of the furnace; as the filler placed the iron ore, limestone, and charcoal into the furnace, the blast (furnace operation) continued, sometimes for more than a year without stopping. When a 12 hour shift was complete, the furnace was tapped by the founder (or keeper). The molten iron that flowed was used by the skilled **moulders** to produce their cast iron products; excess molten iron was diverted into channels (called pigs) in the sandy floor by the **gutterman**. The gutterman was also responsible for removing and disposing of slag, the waste product of the furnace.

**The Moulders:** These skilled workers used wooden flasks, sand, and a pattern to produce a mold into which molten iron was poured to produce a cast iron product. The moulders got paid by the weight of the successfully produced casts only. Successful castings were then cleaned and prepared for shipment by the **cleaners**. Any defective castings were sold as scrap by the ironmaster.

